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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,481	10/30/2003	John D. Larson III	10030993-1	3145

7590 02/02/2005

AGILENT TECHNOLOGIES, INC.

Legal Department, DL429

Intellectual Property Administration

P.O. Box 7599

Loveland, CO 80537-0599

EXAMINER

SUMMONS, BARBARA

ART UNIT

PAPER NUMBER

2817

DATE MAILED: 02/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/699,481

Applicant(s)

LARSON ET AL.

Examiner

Barbara Summons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 21-30 is/are rejected.
- 7) ☒ Claim(s) 17-20 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1:121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/30/03 & 3/19/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: On page 1, at section [0001], line 2, "10/XXX,XXX" should be changed to - - 10/699,289 - -. On page 5, on the third from last line "5K-5S" should correctly be - - 5K-5T - - since the figures include a Fig. 5T (see e.g. the second to last line on page 5 and the last sheet of drawings).

Appropriate correction is required.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1-12 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3-10 and 15-17 of copending Application No. 10/699,289. Although the conflicting claims are not identical, they are not patentably distinct from each other because the "band-pass filter"

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of the '289 application and the "transformer" of the instant application have the same claimed structure and all that is different is the name given the structure based on the intended use of the structure (i.e. filter or transformer). It should be noted that a band-pass filter is the same as a 1:1 impedance transformer. Also, the band-pass filter of the '289 application inherently must have input/output terminals that are equivalent to the first/second terminals of the instant application, and to modify the impedance transformation would require only obvious rearrangement of the terminals.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-5, 13-16, 21-25 and 29 are rejected under 35 U.S.C. § 102(e) as being anticipated by Ella et al. U.S. 6,670,866 (cited by Applicants).

Regarding claims 1 and 2, Fig. 5 of Ella et al. discloses an acoustically-coupled balanced to unbalanced (balun) transformer, comprising: a stacked bulk acoustic resonator (SBAR) comprising: a stacked pair of film bulk acoustic resonators (FBARs)

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92 and 94, FBAR 92 having opposed electrodes 40 and 44 sandwiching piezoelectric layer 42, and FBAR 94 having opposed electrodes 60 and 64 sandwiching piezoelectric layer 62; and an acoustic decoupler 50 between the FBARs 92 and 94, the acoustic decoupler being a layer 50 of acoustic decoupling material (see col. 10, lines 24-27); first terminals 16 and 18 electrically connected to one of the FBARs 94; and second terminals at connection points 41 and 45 being electrically connected to the electrodes of the other FBAR 92.

Regarding claims 13, 14, 21 and 29, Fig. 7 of Ella discloses an acoustically-coupled balun with an impedance transformation of 1:4 (see col. 11, lines 20-26) comprising: two SBARs (left and right in the figure) each having a stacked pair of FBARs with a layer 50/50' of an acoustic decoupler between the stacked FBARs; a first electrical circuit being the line connecting the electrodes 40 and 44' and the line connecting electrodes 44 and 40' connecting one of the FBARs (bottom one) of the left SBAR to one of the FBARs (bottom one) of the right SBAR; and a second electrical circuit (i.e. the line between electrodes 60 and 60') connecting the other of the FBARs (top one) of the left SBAR to the other of the FBARs (top one) of the right SBAR.

Regarding claims 22-24, the device of Fig. 7 is connected such that the ones of the FBARs (bottom ones) of the two SBARs are connected in anti-parallel and the other of the FBARs (top ones) of the two SBARs are connected in series in the same way as Applicants' Fig. 4D, with the first electrical circuit connecting the ones of the FBARs (bottom ones) two first/primary terminals 14 and ground 12 and the second electrical circuit connecting the others of the FBARs (top ones) to second/secondary terminals 16

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and 18. Regarding claim 25, the bottom FBARs have a first electrode 40/40' closest to the underlying substrate 30 (not shown see Fig. 5) and a second electrode 44/44' such that the first electrical circuit connects the first electrode 40 of the left SBAR to the second electrode 44' of the right SBAR and connects the second electrode 44 of the left SBAR to the first electrode 40' of the right SBAR.

Regarding claims 3-5, 15, and 16, Ella discloses the acoustic decoupler 50 as silicon oxide (see col. 10, lines 33-38), which inherently has an acoustic impedance less than the acoustic impedance of the piezoelectric materials listed (see col. 1, line 67 to col. 2, line 3), the acoustic impedance being merely a property of the material that can be found in a suitable textbook (see also other art of record).

6. Claims 1-5, 9-11, 21, 29 and 30 are rejected under 35 U.S.C. § 102(e) as being anticipated by Lakin U.S. 6,720,844.

Regarding claim 1, Fig. 3 of Lakin discloses a band-pass filter that is also an acoustically coupled 1:1 impedance transformer comprising: a stacked pair of FBARs including a top FBAR 300 with a piezoelectric layer 302 and electrodes 303 and 304 electrically connected to first terminals 301 and 305, and a bottom FBAR 313 with a piezoelectric layer 306 and electrodes 307 and 314 electrically connected to second terminals 315 and 316; and an acoustic decoupler comprising layers 350-352 located between the FBARs and controlling the amount of acoustic coupling between the FBARs (see e.g. the abstract and col. 6, lines 31-40). Regarding claims 2-5, the acoustic decoupler comprises a layer (e.g. 350) of acoustic decoupling material that is

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SiO₂ (see analogous layer 450 in Figs. 12 and 4) and so has an acoustic impedance less than the acoustic impedance of the piezoelectric material (also shown in Fig. 12 impedance column), and intermediate between the acoustic impedance of the piezoelectric material and air, and in the recited range of 2 to 16 Mrayl.

Regarding claims 9-11, the acoustic decoupler comprises a three layer Bragg structure of alternating low impedance layers (350 and 352) and high impedance layer 351 and may comprise more or less layers (see col. 6, lines 31-40), wherein the layers have a nominal thickness of one quarter wavelength at the center frequency (see col. 6, lines 11-15).

Regarding claims 21, 29 and 30, Fig. 4 of Lakin shows a 1:1 impedance transformer comprising: two stacked FBARs, one on the left having FBARs 421 and 422 and one on the right having FBARs 424 and 423; an acoustic decoupler comprising Bragg structure layers 450-452 being disposed between the FBARs of both stacks; a first electrical circuit connecting the bottom FBARs of both stacks, the first circuit being the metal connections between the top and bottom electrodes of the bottom resonators 422 and 423 (see also Figs. 5 and 6); and a second electrical circuit connecting the other top FBARs of both stacks, the second circuit being the connection between the bottom electrodes 403 and 407 of the top resonators 421 and 424 (see Fig. 6).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 26-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ella et al. U.S. 6,670,866 (cited by Applicants) taken alone.

Ella et al. discloses the invention as discussed above, except for disclosing series and anti-parallel connections (Fig. 7) rather than parallel and anti-series connections between the FBARs of the two stacks.

However, changing the terminal arrangements is simply a rearrangement of parts that would have been obvious to one of ordinary skill as art recognized alternative terminal coupling arrangements.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the transformer of Ella et al. (Fig. 7) by having changed the terminal connections between the FBARs of the two stacks to be in one of parallel and anti-series rather than series and anti-parallel, because such an obvious modification would have been the mere rearrangement of parts that would have

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included art recognized alternative terminal coupling arrangements, as would have been known by one of ordinary skill in the art.

9. Claims 6-8 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Lakin U.S. 6,720,844 in view of Ella U.S. 6,278,342.

Lakin discloses the invention as discussed above, except for the layer of acoustic decoupling material comprising plastic, polyimide, or poly(para-xylylene)[a.k.a. parylene].

Ella discloses that it is known to use polymers as the low acoustic impedance materials in an acoustic decoupling Bragg structure (see e.g. col. 3, lines 18-33), and also discloses using the electrode of the FBAR as one of the high acoustic impedance layers of a Bragg structure (see col. 3, lines 46-48).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the filter of Lakin (Fig. 3) by having used electrodes (303 and 314) of the resonators as high acoustic impedance layers, and by having replaced one or more of the low acoustic impedance decoupling layers (350,352) with a polymer such as polyimide in view of the explicit suggestion to use polymers including polyimide in such Bragg structures by Ella (col. 3, lines 18-33) and the explicit suggestion by Ella to use electrodes of the resonators as high impedance layers (col. 3, lines 46-48). Furthermore, Ella also suggested that any suitable polymer be used (col. 3, lines 30-33), thereby suggesting to one of ordinary skill plastics and parylene also known acoustic matching layers in the art (see other art of record).

Allowable Subject Matter

10. Claims 17-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

It should be noted that although Lakin U.S. 6,720,844 is considered to anticipate claim 21, it is not considered to anticipate the required connections in claim 13, and so cannot be used on the Bragg structure quarter wavelength layers in claims 17-20. A combination of Ella et al. U.S. 6,670,866 and Lakin '844 was contemplated, but replacing the single dielectric layer 50 of Ella et al. '866 with the Bragg structure would complicate the structure and production process by requiring more layers, and there did not appear to be a suggestion to do so in the references.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The article "Polymer Films as Acoustic Matching Layers" to Hadimioglu et al. teaches using polyimide or parylene as art recognized alternative acoustic impedance matching layers.

Ylilammi et al. U.S. 5,873,154 discloses an FBAR with a single polymer matching layer 36 (Fig. 2).

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Kolm U.S. 3,321,648; Fowler U.S. 3,189,851; and Fowler et al. U.S., 3,174,122 each show FBARs with an acoustic decoupler (e.g. cushion material) therebetween.

Poirier et al. U.S. 3,568,108 and U.S. 3,422,371 (Fig. 5) disclose two stacked FBARs acoustically coupled to a certain degree by a Bragg structure.

Weber U.S. 5,864,261 discloses stacked FBARs acoustically decoupled by a Bragg structure (Fig. 5) and coupled through elements 150 and 151.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bs
January 25, 2005



**BARBARA SUMMONS
PRIMARY EXAMINER**